pure and applied geophysics

OCT 2 1 1993
LIBRARIES

Vol. 139
1992

Birkhäuser Verlag
Basel · Boston · Berlin

C
01
37

PURE AN APPLIED GEOPHYSICS

PAGEOPH
Continuation of Geofisica pura e applicata

Honorary Editors
M. Bossolasco, Torino (Founder)
F. Gassmann, Zürich

Editor in Chief
HIROO KANAMORI
Seismological Laboratory, California Institute of Technology
Pasadena, CA 91125, USA

Editors
ANNY A. CAZENAVE, CNES-GRGS, 18 Ave. Eduard Belin, F-31055 Toulouse, France
VLASTISLAV ČERVENÝ, Institute of Geophysics, Charles University, Ke Karlovu 3, 12116 Praha 2, Czechoslovakia
FRANCO EINAUDI, NASA/Goddard Space Flight Center, Code 910, Greenbelt, MD 20771, USA
KRZYSZTOF HAMAN, University of Warsaw, Institute of Geophysics, Pasteura 7, 02-093 Warsaw, Poland
GARY R. HECKMAN, NOAA – R/E/SE2, 325 Broadway, Boulder, CO 80303, USA
ROGER L. HUGHES, CSIRO, Division of Atmospheric Research, Private Bag Number 1, Mordialloc, Victoria 3195, Australia
PIERRE LANTOS, Centre de Prévision de l'Activité Solaire, Observatoire de Paris, 92195 Meudon Cedex, France
RICHARD LINDZEN, Department of Earth, Atmospheric and Planetary Sciences, Massachusetts Institute of Technology, 77 Massachusetts Avenue, Cambridge, MA 02139, USA
BRUCE P. LUYENDYK, Department of Geological Sciences, University of California, Santa Barbara, CA 93106, USA
RAUL MADARIAGA, Institute de Physique de Globe, Université de Paris VI, 4, Place Jussieu, 75230 Paris, France
MICHAEL L. ORISTAGLIO, Schlumberger-Doll Research, Ridgefield, CT 06877-4108, USA
YOSHIAKI TOBA, Geophysical Institute, Tohoku University, Physical Oceanography Laboratory, Sendai 980, Japan
MAX WYSS, Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO 80302, USA

Executive Editor
EMILE A. OKAL,
NORTHWESTERN UNIVERSITY,
DEPARTMENT OF GEOLOGICAL SCIENCES,
EVANSTON, IL 60208, USA

Book Review Editor
RENATA DMOWSKA, Harvard University, Division of Applied Sciences, Pierce Hall, 29 Oxford Street, Cambridge, MA 02138, USA

Pure and Applied Geophysics welcomes original contribution in English (and occasionally in French and German) on all aspects of geophysics. Manuscripts in solid earth science should be subbmitted to the Executive Editor at the address above, in triplicate, typewritten with double spacing and wide margins. Manuscripts in atmospheric and oceanic sciences should be submitted directly to an editor of your choice. Detailed guidelines for contributors can be found on the inside back cover of this issue.

Subscription Information
This journal appears in 2 volumes of 4 issues per year.
Annual subscription: sFr 1238.–, DM 1468.–, US$ 842.00, postage not included.
Single issue: sFr 178.–, DM 214.–, US$ 126.00, postage not included.
Subscription orders should be placed with Birkhäuser Verlag, P.O. Box 133, CH–4010 Basel/Switzerland or through your bookseller or subscription agency.
Claims for undelivered issues must be made promptly – at the very latest, immediately following receipt of the issue succeeding the missing number. No cancellations are accepted for the calendar year once subscription has been entered. Cancellation of standing orders must be effected 3 months before the end of the publishing year.

Advertising
Orders for advertisements should be sent to Birkhäuser Verlag, P.O. Box 133, CH-4010 Basel/Switzerland.
(FAX: ++41/61 271 76 66)

Copyright
It is a fundamental condition that submitted manuscripts have not been published and, will not be simultaneously submitted or published elsewhere. By submitting a manuscript, the authors agree that copyright for their article is transferred to the publisher if and when the article is accepted for publication. The copyright covers the exclusive rights to reproduce and distribute the article, including reprints, photographic reproductions, microform or any other reproductions of similar nature, and translations. No material published in this journal may be reproduced photographically or stored on microfilm, in electronic data bases, video disks, etc., without first obtaining written permission from the publisher: Birkhäuser Verlag, P.O. Box. 133, CH-4010 Basel/Switzerland.

For users in the USA:
The appearance of the code immediately before each article in this journal indicates the copyright owner's consent that copies of articles may be made for personal or internal use, or for the personal or internal use of specific clients. However, this consent is given on the condition that the copier pay the stated per copy fee through the Copyright Clearance Center, Inc., 21 Congress St., Salem, Mass. 01970, for copying beyond that permitted by Sections 107 or 108 of the U.S. Copyright Law. This consent does not extend to other kinds of copying, such as copying for general distributions, for advertising or promotional purposes, for creating new collective works, or for resale. For copying from back volumes of this journal see Permissions to Photo-Copy: Publisher's Fee List of the CCC.

Printed in Germany on acid-free paper

© 1992 Birkhäuser Verlag, Basel · Boston · Berlin

Subject Index

A

1986 western Nagano earthquake, 255
Acoustic activity, 405
Aftershocks, 179
Anisotropic rocks, 463
Anisotropy, 349
Argentine seismic catalogue, 277
Artificial reservoir, 579
Attenuation, 121

B

b values, 449, 697
Baja California earthquakes, 3
Bayes' theorem, 309
Borehole slotter, 349
Boundary element method, 763

C

χ-square test, 255
Chile, 293
Coal, 215
Coda Q, 255
Constitutive laws, 195
Coulomb failure, 195
Cracks, 121
Creep, 639
Cross-correlation, 293
Crosshole, 349

D

Deep seismicity, 59
Depth dependence, 721
Detection, 609
Dilution, 349
Displacement discontinuity, 763
Double-couple, 349, 627

E

Earthquake clustering, 269
Earthquake energy, 293
Earthquake risk, 277
Earthquake source mechanism, 781
Earthquakes, 179
Effective stress law, 463
Elastodynamic, 763
Error analysis, 375
Event detection, 609
Extensometer, 349

F

Fault detection, 215
Fault segment, 309
Fault stability models, 639
Fault-slip, 657
Faulting, 507, 579
Faulting process, 677
First motion, 627
Fluid, 507, 579
Fluid extraction, 535, 561
Fluid injection, 561
Focal mechanisms, 87
Forecast stress patterns, 449
Fourier transform, 241
Fractals, 269
Fracture complexity, 721
Fracture zone, 121
Friction, 121, 195
Full waveform, 349, 627

G

Gaussian process, 309
Geological time series, 145
Geomechanics, 349
Guided seismic waves, 215

H

Hellenic Arc, 269
Hilbert transform, 255
Historic earthquakes, 3
Historical earthquakes, 3, 17, 87
Historical seismicity, 59
Hydrocarbon, 507

I

Implosive moment tensor component, 781
Induced seismicity, 463, 507, 535, 561, 579, 697, 781

K

Kamchatka, 293

L

Large earthquake recurrence, 277
Ligurian Sea, 179
Localized shear, 195
Location accuracy, 375
Location precision, 375
Low magnitude seismicity, 449

S

Sabbione, N.C., 277
Scott, D.F., 627
Segall, P., 535
Sigalova, O.B., 607
Sprenke, K.F., 609
Swanson, P.L., 375, 639, 657

T

Takahara, M., 255
Thouvenot, F., 179
Trifu, C.-I., 449
Trivedi, N.B., 145
Tsapanos, T.M., 293

U

Urbancic, T.I., 449, 697, 721

W

Wesson, R.L, 561
Wideman, C.J., 627
Williams, T.J., 627, 741

Y

Yamashita, T., 121
Yomogida, K., 255
Young, R.P., 421, 449, 697, 721

Index of Authors

B

Baker, M.R., 481
Ballesteros, L., 481
Bethoux, N., 179
Billington, S., 375
Blake, W., 741
Boler, F.M., 375, 639

C

Cao, S., 215
Cattaneo, M., 179
Cernadas, D.C., 277
Chen, Q., 463
Chowdhury, A.H., 741
Coulombe, A., 349

D

Dedousis, V., 269
Deflandre, J.-P., 405
Diaz, H.L., 481
Dodge, D.A., 609
Doser, D.I., 3, 481
Dubesset, M., 405

E

Ecobichon, D., 349
Estey, L.H., 375
Eva, C., 179

F

Feignier, B., 697, 721
Ferraes, S.G., 309
Fréchet, J., 179, 579

G

Gamond, J.-F., 579
Granet, M., 179
Grasso, J.-R., 507, 579
Greenhalgh, S.A., 215
Guyoton, F., 179, 579

H

Hobbs, B.E., 195
Hsiung, S.M., 741
Hudyma, M., 349

K

Kaip, G., 481
Kanduth, H., 349
Kane, R. P., 145
Kawahara, J., 121
Kingwell, J., 481
Kwok, Y.-K., 241

L

Liritzis, I., 293
Long, J.M., 449
Luo, M., 481

M

Mack, M.G., 763
Makhmudova, V.I., 607
Marone, C., 195
Marroquin, P., 481
Mason, I.M., 215
Maxwell, S.C., 421, 697
McCreary, R., 349
McGarr, A., 347, 781
McGaughey, J., 349

N

Nicholson, C., 561
Nicolas, M., 179
Nur, A., 463

O

Okal, E.A., 17, 59, 87
Ord, A., 195
Ortlepp, W.D., 677
Osella, A.M., 277

P

Pant, D.R., 215
Papadopoulos, G.A., 269
Plotnikova, L.M., 607
Potvin, Y., 349

R

Rowley, K.C., 87
Russo, R.M., 87

M

Macroseismic, 627
Magnitudes, 17, 59
Mantle waves, 17, 59
Maximization, 309
Maximum likelihood method, 255
Mexico, 293
Micro-cataclasis, 677
Microearthquake location, 405
Microseismic, 349, 609
Microseismic location, 375
Microseismicity, 405, 639
Mine seismic events, 741
Mining, 609
Mining-induced seismicity, 421, 657
Mode conversion, 215
Moment tensor inversion, 697
MP250, 609

N

Non-similar scaling relations, 721
Normal stress, 639

O

Oil field seismicity, 481
Oxygen isotope, 145

P

Peak particle velocity, 741
Phase velocity, 121
Pore fluid pressure, 463
Pore pressure, 507, 579
Poroelasticity, 535, 579
Prediction, 309

R

Relocations, 87
Rhombic dodecahedra, 677
Rock mass fatigue, 741
Rockburst, 349, 609, 627, 639, 657, 677

S

Scale-invariant processes, 269
Scattering, 121
Seismic moment, 59
Seismicity, 179, 349
Sequential velocity imaging, 421
Shock rebound, 677
Sill pillar, 349
Slip potential, 657
Source location, 609
Source mechanism, 349, 677
Source parameters, 697
Source processes, 3
Southeastern Caribbean, 87
Spatial distribution, 179
Stick-slip, 741
Stope convergence, 639
Stress cell, 349
Stress interaction, 657
Stress release estimates, 449
Subduction, 309
Surface and borehole gravity, 241

T

Temporal velocity changes, 421
Three-dimensional, 763
Time-lag, 293
Tomography, 349, 697
Transmitted and reflected waves, 121
Triggered earthquakes, 561
Tsunamis, 17

V

Velocity-seismicity association, 421

W

Wave polarization, 405
Waveform, 609
Weak faults, 463
West Texas earthquakes, 481
Western Argentine seismicity, 277

Book Reviews

Book Reviews: 163, 164, 165, 167, 168, 170, 171, 173, 174, 176, 331, 332, 335, 337, 338, 340, 341, 342, 344